

## Screening for Prostate Cancer

THE 1990 CANCER STATISTICS reveal that prostate cancer is now tied with lung cancer as the most common cancer in men. It is expected that more than 30,000 men will die of prostate cancer this year. Potentially curative treatments are available for disease localized to the prostate gland, yet less than half of patients have localized disease at the time of diagnosis.

In the past, the early detection of prostate cancer has relied solely on the digital rectal examination. Current guidelines of the American Cancer Society recommend yearly digital rectal examinations for men older than 40 years. Several studies have clearly shown the shortcomings of the digital rectal examination as a diagnostic technique, however. It is highly subjective and has low sensitivity and specificity, with a positive predictive value between 17% and 30%. Earlier searches for more objective alternatives to this examination turned to the measurement of prostatic acid phosphatase levels. After years of study, prostatic acid phosphatase remains ineffective as a diagnostic test for organ-confined disease and is used almost exclusively for monitoring metastatic prostate cancer. More recent efforts at improving the early diagnosis of prostate cancer have focused on transrectal ultrasonography of the prostate and the measurement of serum levels of prostate-specific antigen (PSA).

Transrectal ultrasonography of the prostate has grown widely in popularity in recent years. Continued progress in equipment technology and scientific assessment of its capabilities have resulted in an effective tool when used within its limitations. Transrectal ultrasonography is incapable of differentiating malignant from benign lesions of the prostate. It should not be used as a screening method in men with otherwise benign prostates by digital rectal examinations and PSA measurements because of poor sensitivity, specificity, and poor positive predictive value. In addition, it would not be cost-effective on a mass population screening level. It has, however, proved to be a useful adjunct when evaluating patients with other high-risk findings such as abnormal findings on a rectal examination or elevated PSA levels. It is also highly effective in guiding histologic examination of specimens during prostate needle biopsies. We currently recommend that transrectal ultrasonography of the prostate be used primarily by a trained urologist for patients with indications for prostate biopsy.

Since its discovery in 1979, prostate-specific antigen has shown its widening usefulness in the management of patients with prostate cancer. It is secreted only by prostatic epithelial cells and is not specific for prostate cancer. Because PSA is produced by both benign and malignant prostate cells, it was originally thought that this would limit, if not completely exclude, its use as a diagnostic tool for prostate cancer. Further evidence, however, shows a substantial differential rate of the production. Prostate cancer cells apparently produce about ten times more PSA per gram of tissue than benign prostatic cells. Thus, even small volumes of prostate cancer can raise serum levels of PSA significantly more than greater volumes of benign prostatic hyperplasia. Recently reported data support the value of the measurement of this antigen (using the Hybritech assay) as a screening test for prostate cancer. Positive predictive values of about 65% have been reported for patients with serum PSA levels of 10  $\mu\text{g}$  per liter or higher and 25% for levels between 4.0 and 9.9  $\mu\text{g}$  per liter.

The advantages of PSA determination in screening are that it is objective, quantitative, and more acceptable to patients than the embarrassment and discomfort of a digital rectal examination. In addition, the combination of a PSA measurement and a rectal examination can provide an even greater level of accuracy. In the future, it may be confidently recommended that all men obtain routine PSA determinations as a screen for prostate cancer, but insufficient data are available at this time for such a conclusion.

Several thoughtful investigators have questioned the basic value of prostate cancer screening, citing insufficient evidence that mortality or quality of life will be affected significantly, in addition to causing some patients' unnecessary worry and unneeded treatment. These aspects clearly need to be considered until long-term studies are completed that address these important points. At present, however, patients who, rightly or wrongly, are apprehensive about prostate cancer must be treated. It is difficult to hold back from them a potentially important diagnostic test. Unfortunately, medical judgment is being driven by the ever-increasing onslaught of new, untested technology.

The digital rectal examination, despite its limitations, continues to be the simplest and most cost-effective method of detecting prostate cancer. The use of transrectal ultrasonography for screening the prostate should be discouraged because of its inherent inability to discriminate between benign and malignant disease and its considerable cost. Insufficient data are available to recommend the routine screening of all men with prostate-specific antigen, but its use as an adjunct in the detection of prostate cancer in men with other risk factors is clear.

MICHAEL T. MAC FARLANE, MD  
Los Angeles, California

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## Laparoscopy in Urology

LAPAROSCOPY, LONG A MAINSTAY of gynecologic diagnosis and therapy, has received much recent publicity regarding applications in abdominal general surgery and in urology. Urologists have always been trained as endoscopic surgeons, and laparoscopic surgery is a logical extension of their therapeutic options. Laparoscopic procedures must be compared with the standard incisional approach by two criteria: the procedure should be of substantially equivalent or superior efficacy, and it should have similar or less morbidity. In general, the advantage of the laparoscopic technique lies in decreased morbidity. Hospital stays tend to be shorter, if required at all, and the return to usual preoperative activities, including work, is usually faster after laparoscopic procedures than after standard open procedures.

The evaluation and possible treatment of nonpalpable undescended testes most clearly meet the criteria of good efficacy and decreased morbidity. A laparoscopic demonstration of blind-ending gonadal vessels eliminates the need for surgical exploration in some of these children, and, in certain other cases, laparoscopy allows a preliminary manipulation of testicular blood flow, which may improve the likelihood of

successful surgical orchiopexy at a later date. Laparoscopy in the diagnosis and treatment of nonpalpable undescended testes should not be considered a necessity, but it can be useful when done by a surgeon proficient in the technique.

Laparoscopic pelvic lymph node dissection to stage urologic malignancy and laparoscopic varicocele ligation have also been reported with good results and appear to be as effective, with equal or less morbidity, as open surgical procedures. The laparoscopic approach is particularly attractive in the staging of prostate and perhaps bladder cancer, as the documentation of metastatic disease by laparoscopy may spare a patient an extensive surgical exploration. Once again, in these indications, laparoscopy should be viewed as an option, possibly beneficial in certain selected patient populations when done by an experienced practitioner, and not as a requirement in the care of these diseases.

Other procedures are now being described in reports from clinical practice or animal laboratories. For example, human nephrectomy has already been performed laparoscopically. Although theoretically there are few limits to the extent to which this technology can be advanced, each potential "advance" must be compared with standard therapy to determine its clinical usefulness, if any.

GEORGE DANIELS, JR, MD  
Stanford, California

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## Extracorporeal Shock-Wave Lithotripsy With Minimal or No Anesthesia

EXTRACORPOREAL SHOCK-WAVE LITHOTRIPSY (ESWL) has revolutionized the treatment of patients with nephrolithiasis and ranks as one of the great accomplishments of the past decade in medicine. Since its clinical introduction in Germany in 1980 and in the United States in 1984, ESWL has become the procedure of choice for most patients with nephrolithiasis requiring surgical treatment. With literally hundreds of thousands of patients treated worldwide to date, its safety record also compares favorably with any other surgical procedure. Today, major efforts are directed toward improving the ease of ESWL treatment for both patients and physicians, with special emphasis on decreasing anesthesia requirements.

Extracorporeal shock-wave lithotripsy procedures with the German-made Dornier HM3 machine, the original or "first-generation" lithotripter that remains in popular use, nearly always require either general or regional (spinal or epidural) anesthesia. This machine also requires subtotal immersion of the patient within a water bath. Newer second-generation ESWL machines marketed today have almost universally eliminated the need for patient immersion. They also have much-reduced anesthesia requirements. The reduced anesthesia requirements promise a further reduction in the already minimal morbidity associated with ESWL. This reduced anesthesia requirement, however, has been achieved only at the expense of some decrement in machine power. The original Dornier HM3 lithotripter remains the "gold

standard" device in terms of its proven ability to produce adequate stone fragmentation over a wide range of stone size and composition, using the fewest number of shock waves.

Among the second-generation lithotriptors, a variably lessened efficiency in stone fragmentation is weighed against variably lessened anesthesia requirements. At one end of the spectrum of the second-generation lithotriptors are the piezoelectric devices, which produce the least patient discomfort during treatment, allowing many patients to be treated with no anesthesia. Electromagnetic devices now available allow most patients to be treated with only intravenous sedation. Gains in anesthesia requirements, however, are offset to some degree by the need for many more shock waves for each stone and often many treatment sessions. At the other end of the spectrum of second-generation lithotriptors are machines that still use a spark-gap electrode power source, such as the United States-made Medstone STS machine. These machines more closely approximate the fragmentation results and retreatment rates achievable with the original HM3 machine, while still allowing most patients to be treated with only light intravenous sedation.

All of the new second-generation lithotriptors have in common a notable reduction in anesthesia requirement. With their use, patients are awake and comfortable during the treatment of their kidney stones. Patients can be ambulatory and resume normal oral intake immediately after the completion of ESWL and thus be treated as outpatients. Many patients who might otherwise have avoided the treatment of their kidney stones find ESWL much more attractive with such a regimen. Perhaps even more important, the ability to deliver treatment with minimal or no anesthesia extends the ready applicability of ESWL to that group of patients with nephrolithiasis and severe coexisting medical problems in whom the risks of anesthesia might be prohibitive.

JOHN N. KABALIN, MD  
Palo Alto, California

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## Male Infertility Update

THERE HAVE BEEN SEVERAL advances recently in the field of male infertility, including improvements in vasovasostomy and vasoepididymostomy, the micromanipulation of human gametes, the ease of measuring antisperm antibodies, and further tests of the fertilizing capacity of sperm including the sperm penetration assay (or hamster test).

About 500,000 men a year undergo a vasectomy in the United States for permanent sterilization. With the increase in the divorce and remarriage rates, many of these men wish to have their vasectomies reversed. Beginning in the mid-1970s, the operating microscope came into wide use to aid in the anastomosis of vasa deferens. It soon became apparent that more was needed than simply reconnecting the newly severed ends. At times, the fluid seen from the upstream portion of the vas was inspissated and contained no sperm. With the use of the operating microscope, attempts were then made to reconnect the vas to a proximal area, such as the